

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Patent Appln. No.: 09/769,376



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REMARKS

Review and reconsideration on the merits are respectfully requested.

Claims 1-6 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Several distinct grounds of rejection are set forth, which are discussed separately below.

A. With respect to claim 3, the Examiner argues that the term “superposed” is unclear since Applicants also show that this “superposed” layer “underlies” the hard coat layer. Moreover, in the following paragraph, the Examiner the argues that it is unclear how the various layers recited in dependent claims 2 and 3 are interrelated, and where they are located in relation to each other in the resin substrate.

In response, the Examiner is kindly requested to note the amendments to claims 2 and 3, which are deemed to resolve any perceived ambiguities in the language thereof, without scope reduction. In view of these amendments, reconsideration and withdrawal of this ground of rejection is respectfully requested.

B. In claim 1, the Examiner states that the symbol “ R_a ” is unclear. It is apparent that Applicants intend the standard surface roughness designation “Ra”. See claim 4 in this regard, where the “a” is not shown as a subscript.

Applicant have amended claim 1 for consistency, as requested, which resolves this ground of rejection without reducing claim scope.

In view of the foregoing, reconsideration and withdrawal of the rejection under § 112, second paragraph, are respectfully requested.

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At pages 2-3, claims 1-2 and 4-6 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Oka et al, U.S. Patent 6,064,524 (Oka et al.).

At page 3, claim 3 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Oka et al in view of Stein et al, U.S. Patent 6,322,860 B1.

With respect to claim 1, the Examiner admits that Oka et al does not expressly describe the particular thickness range claimed, nor does Oka et al show the particular surface roughness value claimed. The Examiner takes a broad approach in arguing that Oka et al shows an optical functional multilayer structure comprising a layer of a cured epoxy resin, a polyvinyl alcohol film and a clear hard coat layer.

These rejections are respectfully traversed. Applicants submit that independent claim 1 is patentable over Oka for the following reasons.

Oka et al. relates to an antiglare-antireflection film. Oka et al. is quite different in its technical field from that of the present invention. The present invention relates to a resin substrate for optical use which is represented by a liquid-crystal cell substrate. The liquid-crystal cell substrate is required to have a surface roughness Ra lower than that of the antiglare-antireflection film. The antiglare-antireflection film as described in Oka et al. is characterized by imparting light diffusion property by intentionally increasing the surface roughness. In the present invention, a smoother surface is required. On the other hand, the antiglare-antireflection film as described in Oka et al. requires a larger surface roughness to impart the light diffusion property.

- 8/7
optimizable
- intended use

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Although the conventional resin substrate have been formed on a glass substrate or by casting, because the surface roughness Ra of the resin substrates reflects the surface roughness Ra of the glass substrate or the mold for casting, the resin substrates usually have a surface roughness Ra of 10 nm or higher. In the present invention, by forming a free surface by the casting and setting the thickness to 100 to 800 μm , surface smoothness can be greatly enhanced to accomplish an excellent surface roughness Ra of 0.8 nm or lower as recited in claim 1.

Oka et al. describes in Example A1 that an ionizing radiation curing resin was coated on a triacetyl cellulose (TAC) film (F1-UV-80 manufactured by Fuji Photo Film Co., Ltd.) and a matte polyethylene terephthalate (PET) film having a fine uneven surface (Lumirror X-45 (trade name) manufactured by Toray Industries, Inc.) was laminated to the TAC film having a dried resin layer so that the resin layer faced the matte PET film, thereby preparing an antiglare-antireflection film. Oka et al. is silent about the surface roughness Ra of the matte PET film having a fine uneven surface (Lumirror X-45). However, when Applicants obtained a sample of Lumirror X-45 and measured the surface roughness Ra on the front and back surfaces thereof, the surface roughness Ra was about 110 nm. That is, the surface roughness Ra of the resin layer of the antiglare-antireflection film is also about 110 nm.

Oka et al. is also silent about the surface roughness Ra of the TAC film (FT-UV-80). However, when Applicants obtained a sample of FT-UV-80 and measured the surface roughness Ra on the front and back surfaces thereof, the surface roughness Ra was about 3 nm.

App → .8nm or LOWER

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Applicants have prepared a Declaration Under 37 C.F.R. § 1.132 in order to demonstrate that the TAC film and the matte PET film do not satisfy the surface roughness requirement of the present invention. (The executed declaration will be filed as soon as we have received it).

As discussed above, Oka et al. is silent about a resin substrate for optical use which has a surface roughness Ra of 0.8 nm or lower on at least one side.

→ sure is antireflection film
→ plus, intended use

In the present invention, a special effect of forming a liquid crystal cell excellent in display quality including contrast and visibility using STN liquid crystals and ferroelectric liquid crystals can be taken by using a resin substrate for optical use which has a surface roughness Ra of 0.8 nm or lower on at least one side. The surprising effects are supported by the comparison between Example 1 and the Comparative Example in the specification of the present application. As a result, the liquid crystal cell substrate on one side of which was a resin substrate for optical use having a surface roughness Ra of 0.2 nm (0.2 nm on the free surface side, 10 nm on the belt side) as shown in Example 1 showed excellent display quality, whereas light leakage was observed in the liquid crystal cell substrates on both sides of which were resin substrates for optical use having a surface roughness Ra of 15 nm as shown in Comparative Example due to alignment defects.

As described in the Comparative Example, in view of the fact that even when the resin substrate used in the cell of the Comparative Example has a surface roughness Ra of 15 nm, light leakage was observed due to alignment defects, Applicants submit that any liquid-crystal cell made from the antiglare-antireflection film as described in Example A1 of Oka et al can never achieve superior display quality, because the surface roughness Ra of the antiglare-antireflection

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film (about 110 nm) is 7 times larger than that of one side of the resin substrate used in the cell of the Comparative Example.

As further supporting evidence, co-inventor Mr. Yagi modified certain aspects of the Example and Comparative Example in the specification of the present application, and those results are presented in the form of a Second Declaration Under 37 C.F.R. §1.132. (Again, the executed declaration will be filed as soon as we have received it).

Accordingly, the present invention as defined in claim 1 is not rendered *prima facie* obvious by Oka et al, because at a minimum the claimed surface roughness characteristic is not taught or suggested. In the alternative, the record evidence clearly rebuts any inference of *prima facie* obviousness, for the reasons indicated above.

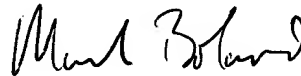
With respect to the separate rejection based on dependent claim 3, Applicants submit that claim 3 is patentable for at least all of the reasons set forth for its base claim 1. Accordingly, upon allowance of claim 1 as requested above, all of the claims in this application should be found allowable by the Examiner.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Mark Boland
Registration No. 32,197

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: July 11, 2002



APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) A resin substrate for optical use which comprises a multilayer structure having a surface roughness $[R_a]$ R_a of 0.8 nm or lower on at least one side and having an average thickness of from 100 to 800 μm .
2. (Amended) The resin substrate for optical use of claim 1, [which has] wherein the multilayer structure comprises a layer of a cured epoxy resin as a base layer.
3. (Amended) The resin substrate for optical use of claim [1 or] 2, [which has] wherein the multilayer structure further comprises a transparent hard coat layer having a thickness of 0.1 μm or larger as a surface layer and a poly(vinyl alcohol)-based gas barrier layer as [a superposed] an intermediate layer [underlying] between the hard coat layer and the base layer.

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